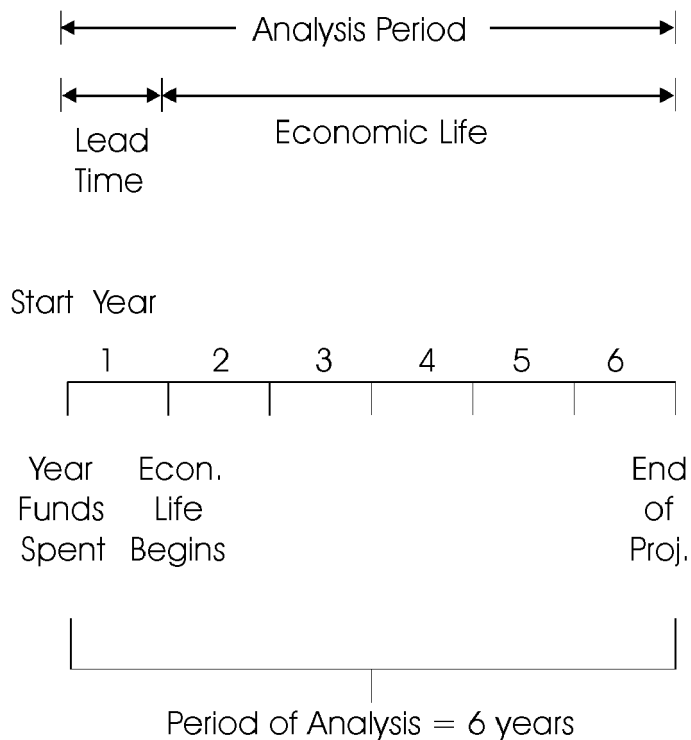

Budget Analysis

Introduction

Functional proponents, in partnership with the Information Management community, are responsible for handling acquisition, overseeing the installation of hardware and software, and ensuring effective system operation and maintenance. Frequently, the project manager must also function as a cost analyst to select an appropriate solution that satisfies both the functional and budgetary requirements. This section illustrates how to complete a Budget Analysis. In this process, the analyst must consider reasonable solutions to satisfy a problem, then select one for life-cycle costing. A Budget Analysis documents the costs of a relatively modest systems resource acquisition, and is performed when the range of the anticipated program cost is \$50,000 to \$250,000. Any cost analysis for items below \$50,000 is at the discretion of management. The purpose of conducting a Budget Analysis is to ensure the preferred alternative falls within the range prescribed above. Although various approaches are certainly considered as possible solutions, the analysis only includes the preferred investment alternative. This simpler form of analysis is considered appropriate for the modest level of resource acquisition.

General Guidelines for Performing Budget Analysis

1. **Parameters.** The Budget Analysis consists of basic parameters necessary to gather all costs for the selected alternative. An explanation of each parameter is given below:
 - a. **Start Year.** The first year in which costs occur for the selected alternative. All costs in the Budget Analysis are estimated to reflect the price level of the start year.
 - b. **Lead Time.** The period of time between initial funding or decision and commencement of the economic life.
 - c. **Economic Life.** The period of time over which the benefits of the selected alternative are expected to accrue. The economic life of an alternative is often limited by the alternative's physical life (the period of time over which the asset can operationally perform) or technological life (the period before the asset becomes technologically obsolete).
 - 1) In a Budget Analysis, the economic life of an AIS or program for Subclass VI(c) projects (\$50 K - \$250 K) is generally assumed to be five to seven years.
 - 2) The analyst should note that an AIS comprises various types of equipment, each with its own period of utility, or equipment life. Equipment life is the time during which the equipment of the system is operational without an undue number of repairs and while the vendor continues to provide support. Thus, "equipment life" does not always coincide with "system or economic life." If the life of a certain piece of equipment in an AIS is shorter than the system life itself, the analyst must include equipment replacement or upgrades to enable the system to function over its entire life. Guidance regarding the lives of various resources can be found in DA PAM 25-2 and DA PAM 11-2 [Para. 3-2j(3)].
 - d. **Period of Analysis.** The economic life of the selected system alternative plus the lead time, or the period of time from the start year to the end of the economic life. Figure 2-1 provide a typical example of the relationships among the parameters in a Budget Analysis (**note:** a 5-year economic life and 1-year lead time were used for this example).
2. **Constant Dollars and Inflation.** Inflation is the rise in costs (or prices) of goods and services over time. In a Budget Analysis, inflation is generally not applied to the costs of the selected alternative.



Relationships among key dates
in an Budget Analysis.

Figure 2-1

- a. *Constant Dollars.* The Budget Analysis should be done using constant dollars, where costs do not include inflation. The use of constant dollars indicates constant purchasing power in terms of the dollar value of the start year. Thus, all costs of the selected alternative in a Budget Analysis reflect the level of prices for the start year.
- b. *Use of Inflation.* In most Budget Analyses, inflation will not be a problem. There may be times, though, when the analyst will have to inflate or deflate certain costs. For example, if cost estimates are obtained in 1997 prices, but the start year of the analysis is not until 1999, these costs must be inflated from 1997 to 1999. A detailed explanation for handling this problem is given in "Step 4: Determine Costs."

Steps to Performing a Budget Analysis

Budget Analysis consists of five basic elements. This section contains a detailed discussion of each step.

1. **Define the Objective.** The statement of the mission objective should clearly define the function to be accomplished or the requirement at hand. The objective should be stated in concise, unbiased and, if possible, quantifiable terms.

Perhaps the single most important step in the Budget Analysis is to define the objective. Defining the objective sets the stage for the entire analysis, including

its objectivity. If this step is completed incorrectly, the remaining analysis may be flawed. To define the objective, the analyst must provide a clear, concise, and unbiased statement of the requirement. The objective should also be realistic, and should be expressed in quantifiable or measurable terms.

The following example illustrates how an objective can be correctly and incorrectly defined.

PROBLEM: Managers of the personnel office notice that the employees are always lining up at the three laser printers in the department, wasting valuable productivity time. They recognize that reasonable access to laser printing is a problem that must be solved.

CORRECTLY STATED OBJECTIVE: To provide laser printing capabilities to 72 employees. Capabilities should provide a wait time of no more than three minutes and allow users to continue working while waiting for documents to print.

INCORRECTLY STATED OBJECTIVE: The personnel office needs to provide each employee with a laser printer.

In the example above, the correctly stated objective is in unbiased terms, while the incorrect one is biased

towards purchasing a laser printer for each employee. Thus, the wording is critical in stating the objective. Not only should the objective be unbiased, it should also identify explicit criteria for measuring the results which can be applied to any solution. In the example, the standards are: 72 employees must have laser printing capability, the wait time must not be more than 3 minutes, and all employees must be able to continue to work while printing. Any proposed solution must satisfy all the stated criteria.

Table 2-1 provides a checklist to help the analyst define the objective of the program for a Budget Analysis.

2. Formulate Assumptions. An assumption is a statement describing unknown factors, data and circumstances that may affect the outcome of the analysis. Assumptions are used to describe the future environment when factual data about the environment are unknown. Often, analysts must formulate assumptions before they can choose alternatives wisely. Assumptions must be stated so that reviewers can assess their impact on the Budget Analysis. Assumptions must also be realistic and logically consistent so that reasonable solutions are being considered, which in turn adds credibility to the analysis. Assumptions should never be used if factual data is available or can be obtained, for they can impact the validity of the analysis.

Table 2-1

Objective Checklist	Complete
Does the objective address the actual problem?	
Is the objective concise and understandable?	
Is the objective formulated in unbiased terms, without stating a specific solution?	
Are specific outputs or results of the requirement clearly described?	
Are explicit criteria for measuring the outputs for results clearly identified?	
Are the requirement and criteria realistic and achievable?	

Formulating assumptions is an iterative process. As the analysis develops, information that was previously unknown will become available to the analyst. The assumptions of the analysis will change and, in turn, lead to refinements in the definition of alternatives. By recognizing this process as being evolutionary, the analyst can adapt and make appropriate adjustments. The result is a sounder and better prepared analysis.

Assumptions can be made on general parameters which pertain to the entire analysis, or on specific aspects of the analysis which apply only to certain alternatives. Some common assumptions include, but are not limited to:

- € the start year,
- € the economic life of a system or piece of equipment,
- € estimated future costs,
- € system or program requirements,
- € time and schedule constraints,
- € physical constraints.

The stated assumptions shown are realistic and account for some uncertainty.

Table 2-2 provides a checklist to help the analyst formulate assumptions for a Budget Analysis.

The following example illustrates how assumptions are correctly formulated.

3. Identification of Alternatives. The process of identifying alternatives includes listing and describing all reasonable alternatives to accomplish the requirement, as stated in the objective. Following that, the preferred alternative is selected for further analysis. This shows the decision maker that several options were considered by the analyst.

The following guidelines will assist the analyst in choosing appropriate alternatives to document:

- a. *Determining Sources.* The first step in identifying alternative solutions is to determine sources for presenting reasonable alternatives. The analyst often relies on personal experience, professional publications, and cognizant personnel as knowledgeable sources.
- b. *Documentation of Alternatives.* After the information has been gathered from the selected sources, all reasonable alternatives (including the status quo) must be documented by specifying the technical characteristics of the solution and describing the components and functions of the automated information system.
- c. *Determine Feasibility.* State how the outputs/results meet or fail to satisfy the criteria stated in the objective. This documents the feasibility of the alternatives. An alternative that does not meet the requirements of the stated objective is not feasible. Here, the analyst then states that the alternative

PROBLEM: Managers of the personnel office notice that the employees are always lining up at the three laser printers in the department, wasting valuable productivity time. They recognize that reasonable access to laser printing is a problem that must be solved.

OBJECTIVE: To provide laser printing capabilities to 72 employees. Capabilities should provide a wait time of no more than three minutes and allow users to continue working while waiting for documents to print.

ASSUMPTIONS:

1. The start year is 1999.
2. Lead time (period extending from the expenditure of funds to the completion of installation) is one year.
3. The economic life of the selected alternative is five years.
4. Printer use is expected to remain constant over the period of analysis.
5. Personnel and workload are expected to remain constant over the period of analysis.

Table 2-2

Assumptions Checklist	Complete
Has the economic life of the selected alternative been defined?	
Are the assumptions realistic and logically consistent?	
Is there any uncertainty that should be accounted for?	
Have policy and procedure limitations been considered?	
Have physical limitations been considered?	
Have time related considerations been identified?	
Can verifiable facts replace an assumption?	

was considered but determined to be infeasible, thus precluding it from further consideration. Although the analyst may discover that a few alternatives will be infeasible, it is of vital importance that all reasonable solutions be considered and documented for higher levels of review. From the remaining feasible alternatives, the analyst selects one for further analysis. Normally, the alternative that best meets the requirements is chosen.

Table 2-3 provides a checklist to help the analyst define alternatives for the program and select the preferred alternative in a Budget Analysis.

The following example documents several alternatives, including the status quo. This shows the reviewer that different options to satisfy the require

Table 2-3

Assumptions Checklist	Complete
Have appropriate sources of information for identifying reasonable solutions been utilized and documented?	
Have reasonable alternatives satisfying the requirements stated in the objective been identified?	
Have all alternatives been checked against the measures of outputs or results outlined in the objective?	
Do the alternative descriptions show how measures of the outputs or results meet or fail the measures stated in the objective?	
Have the components and functions of the alternatives been clearly described without obscuring the narrative with too much detail?	
Has the alternative that best meets the requirements been selected?	

PROBLEM: Managers of the personnel office notice that the employees are always lining up at the three laser printers in the department, wasting valuable productivity time. They recognize that reasonable access to laser printing is a problem that must be solved.

PROJECT OBJECTIVE: To provide laser printing capabilities to 72 employees. Capabilities should provide a wait time of no more than three minutes and allow users to continue working while waiting for documents to print.

ASSUMPTIONS:

1. The start year is 1999.
2. Lead time (period extending from the expenditure of funds to the completion of installation) is one year.
3. The economic life of the selected alternative is five years.
4. Printer use is expected to remain constant over the period of analysis.
5. Personnel and workload are expected to remain constant over the period of analysis.

ALTERNATIVES CONSIDERED:

1. **STATUS QUO:** Currently, three PCs have laser printers connected to them. All employees must place their files on a diskette. When an employee wants to print a file they must go to a PC with the laser printer connected and print from there. This causes employees to wait in line to print their documents while others print their's. Because this alternative does not satisfy all of the criteria, it is not feasible.

2. **3270 TERMINAL EMULATION:** Provides 3270 terminal emulation for

personal computers (PCs). Users would then dial up the organization's mainframe to submit jobs, directing the output to the centrally located laser printer. This alternative was not selected because the mainframe printer is located on the first floor and would cause employees to travel back and forth between the first and sixth floor several times daily to receive their print jobs.

3. **ONE-FOR-ONE CONNECTION:** Provides for a laser printer to be directly attached to every personal computer. This option is not feasible due to lack of space at individual work stations.

4. **LAN CONNECTION:** This alternative provides laser printer services to all of the employees' personal computers by sharing resources over a LAN. This solution allows the employees to continue working while waiting for documents to print. On average, wait time is approximately 2.5 minutes. Printers would be a shared resource, servicing the individual offices and user clusters of up to eight people. One PC in each cluster would act as the printer server. This alternative, however, was not selected due to the high costs of implementation and maintenance. Both of these costs reflect the LAN's many capabilities, all of which are, except for printing capability, unnecessary for the project objective. Therefore, this alternative was not selected.

5. **LASERBOARD INSTALLATION** (selected alternative): This solution provides efficient and dependable laser printer capability to all employees via their personal computers. A laserboard, connecting up to six employees to a

ment were considered, not just the chosen solution. Each alternative is described fully without being obscured by technical details and jargon. All the descriptions specify how the alternatives meet or fail the expected output and results. In addition, documentation which states why a feasible alternative was

not selected is also provided.

The following example illustrates the process of identifying alternatives for a Budget Analysis:

4. **Determine Costs.** All costs associated with the

selected alternative should be included in the analysis. The source and calculation of each cost must be identified in the analysis as well.

a. *Determine Cost Categories.* Various financial analysis guidelines identify major cost categories and their sub-groupings. In addition to the Corps of Engineers, the Department of the Army and the Department of Defense continually review cost category structures to make analysis more meaningful and to reflect current acquisition strategies. There are elements associated with AIS acquisitions that constitute major cost drivers. These cost drivers basically remain the same, regardless of the structure mandated by the current applicable guideline, and can be categorized as nonrecurring and recurring.

- 1) *Nonrecurring Costs* are costs that are paid one time. Examples include investment costs for hardware and software, as well as one-time costs associated with investments such as site activation and initial training.
- 2) *Recurring Costs* are those paid on a periodic basis. These are costs associated with operations and maintenance, and include such items as computer or other equipment maintenance, leases, and supplies.

Another type of cost that deserves attention but is not included in the Budget Analysis is the “sunk cost”. A sunk cost is an unrecoverable past cost incurred before the start year of the analysis. These costs have no effect on the future and are thus disregarded in the Budget Analysis.

Listed below are the major cost elements considered when conducting financial analyses of Subclass VI resource acquisitions. They are categorized as Investment (Nonrecurring) and Operations (Recurring). A complete list of authorized DA cost elements required for MAISRC-level financial analyses are provided in Appendix B.

INVESTMENT (NONRECURRING) COSTS

Project Management

Hardware
Software
Documentation
Initial Training
Site Activation
Test and Evaluation
Parallel Operations

OPERATIONS (RECURRING) COSTS

Supplies
Operations
Maintenance
Leases

b. *Gather Data.*

- 1) The first activity in gathering data is to think of what data is needed for each cost element. Table 2-4 discusses important points to consider when gathering data.
- 2) The second activity in gathering data is to identify the sources for each cost element and their component costs. The following examples provide data sources for various types of information. The list of sources is not inclusive.

Government Publications: General Service Administration (GSA) price lists can be used to determine the costs of commonly requested hardware and software available at government rates. Most vendors have their own GSA price lists. The government pay scale is used to develop labor costs for various system support

Table 2-4

COST ELEMENT	CONSIDERATIONS
Nonrecurring Costs (One Time Costs)	
1. Project Management	<ul style="list-style-type: none"> € Is a special project team required? € How is the project management team made up? Grade levels? € Are there contractors supporting the project management office? € What are the expected annual contractor costs? € Will travel be required by the project team?
2. Hardware	<ul style="list-style-type: none"> € Will any new hardware be needed, including CPUs, file servers, and peripherals such as printers? € What is the new hardware configuration? € Is there a contract vehicle for purchasing the hardware? € When will the hardware be upgraded? € What communications equipment is needed? € Will existing modems be used?
3. Software	<ul style="list-style-type: none"> € Will the hardware require any new operating software? € What new commercial-off-the-shelf (COTS) or proprietary software will be needed? € When will the software be upgraded? € Will any new application software be required? € What is the estimated time to complete the software development? At what level? Contractors? In-house development? € Any data conversion needed (e.g., from manual to automated, or from system to system)? € What communications software is required?
4. Documentation	<ul style="list-style-type: none"> € Will hardware or software technical manuals be required? € Will user manuals be required? € Will manuals be off-the-shelf or developed? € How many manuals are required? At what per unit cost?
5. Initial Training	<ul style="list-style-type: none"> € Will training be required? If so, how much? € How many people will be trained? € Will people be trained in a classroom setting? With computer-based instruction? € Is travel required for the training? Per diem?

Table 2-4 (continued)

COST ELEMENT	CONSIDERATIONS
6. Site Activation	€ Will a site survey be required? Who will do the survey? At what GS level or contractor rate? € Will facility modifications or upgrades be required before the system can be installed? € Will additional communications capabilities need to be installed for for the system? Dedicated circuits? Dial-up circuits? What line speed?
7. Test and Evaluation	€ Will testing and evaluation be required? € When and where will it occur? € Will it be completed by in-house or contractor personnel? At what GS level or contractor rate?
8. Parallel Operations	€ Will the current system be maintained while the new system is implemented? For how long? € Who will operate the current system while the new one is being implemented? Government or contractor personnel? € At what GS levels or hourly contractor rates?
Recurring Costs	
1. Supplies	€ What paper products are needed? € What hardware and software products will be required? Tapes? Floppy diskettes?
2. Operations	€ How many people will participate in supporting/operating the system? € Will operators be government personnel or contractors? € What are the GS levels or hourly contractor rates? € What will be the costs for utilizing outside service bureaus, if any (especially under "Status Quo")?
3. Maintenance	€ What is the warranty period for hardware? € What is the warranty period for software? € What are the annual hardware maintenance charges? € What are the annual software maintenance charges?
4. Leases	€ Will any of the hardware or software be leased? What are the annual costs? € Will any communications equipment or lines be leased? What are the annual costs?

functions. Pay rates are determined by the civilian employee's Grade and Step (GS) level. When developing cost estimates, a median rate (Step 5) is assumed within each grade.

U.S. Army Information Systems Command Resource Factors Handbook (USAISC Pamphlet No. 11-2) provides details on the costing of elements, including civilian and military pay, hardware and software, telecommunications, and other operating and support costs.

Professional Publications: Publications such as DataPro are recognized authorities on hardware

and software. These publications contain an industry-wide surveys, detailed technical specifications, and performance comparisons. The publications contain vendor prices and associated equipment costs such as installation and maintenance fees. This type of professional publication can be very useful to determine alternative solutions to improve system operations (see Step 3: Identify Alternatives).

Other professional publications include industry magazines such as Info World, PC Week, and distributor catalogs such as Black Box Catalog. These publications typically contain less detailed information than DataPro, though they are useful for determining costs for a variety of products.

Contracts: Vendor contracts provide pricing on products and services over the life of the contract. Current contracts are especially useful since they contain the precise cost information used for recently procured hardware, software and technical services.

Expired contracts are also useful because they contain historical information that can be extrapolated into the present or future. For example, historical contract prices can be used to project, using inflation, the current cost of products and services. Cost estimates should be adjusted for product comparability and normal price increases.

Cost information can be obtained from contracts held by the Corps of Engineers as well as from other government agencies.

Budget and Financial Reports: Budget reports provide information on planned funding limitations. Financial reports contain data on expenditures and are particularly useful for conducting trend analysis and extrapolating future costs.

Site Specific Information: Site specific information can be obtained through questionnaires or interviews. This type of data is valuable because it is obtained “at the source.” Freq-

uently, financial reports provide information that has been summarized, so that individual line item costs are indeterminate. Site specific data can be gathered with the appropriate level of detail required to adequately support the analysis. This information also provides the analyst with an excellent view of how operations are performed in the current environment.

Project Manager's Office: The Project Manager Office (PM) can supply guidance on what assumptions should be made in the analysis. For example, the Project Manager makes the decisions about what training should be conducted, what personnel will be trained, etc. Whether or not site surveys are required and how they should be performed; and what configurations of hardware and software will ultimately be installed.

- 3) *Units of Measure:* A useful way to accurately determine the various costs involved is to break each cost down into units. Most of the time, each cost element will have a separate and distinct methodology, but the basic premise is the same for all cost elements: how many units are needed, and what is the per unit cost. Table 2-5 lists the typical units of measure for various cost elements.
- c. *Cost Estimate Timeline.* One way to visualize the timing and magnitude of each cost for the selected

Table 2-5: Units of Measure for Cost Elements

Nonrecurring Costs	Typical Units of Measure
1. Project Management	number of personnel assigned to project management; salary per year; fringe benefits
2. Hardware	number of pieces of hardware; price per piece of hardware
3. Software	number of commercial off-the-shelf packages; price per package; site licenses; number of upgrades required; price per upgrade; number of lines of code or similar measure; number of estimated hours to program; number of programmers; average hourly cost of programmers
4. Documentation	number of manuals required; cost per manual
5. Initial Training	number of personnel to be trained; number of trainers; number of classes and hours; cost per trainer, trainee, or class; number of days per diem per trainee; average transportation cost per trainee
6. Site Activation	number of square feet to be affected; cost per square foot to activate; number of communication lines to be installed; cost per line
7. Test and Evaluation	number of tests; cost per test; number of personnel involved in test; cost per person to test and evaluate; number of days per diem, if applicable; average cost of transportation
8. Parallel Operations	number of hardware/software units to be maintained; number of months for parallel operations; number of personnel involved; average GS level or average contractor cost
Recurring Costs	Typical Units of Measure
1. Supplies	number of tapes, floppy disks, boxes of paper; printer cartridges; per unit cost
2. Operations	number of personnel; average GS level or average contractor cost; number of hours required
3. Maintenance	number of hardware and software units to be maintained; cost per month or year; cost of maintenance contracts
4. Leases	number of communication lines; amount of square footage; average annual cost per unit

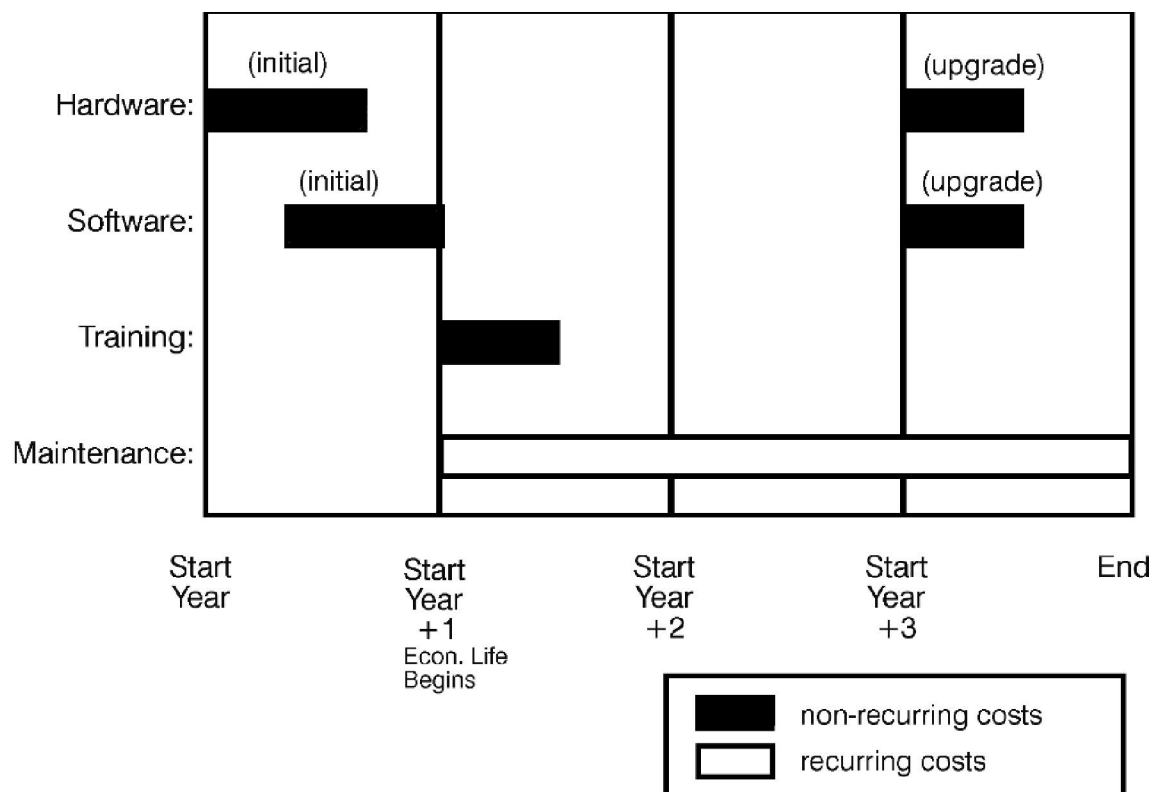


Figure 2-2

alternative is by creating a cost estimate timeline. For illustrative purposes, a four-year period of analysis and a few costs are shown in Figure 2-2. The actual timing, magnitude, and number of costs will vary accordingly.

- d. *Cost Documentation.* After the sources have been identified and the costs have been obtained and documented, the analyst must provide a description, calculation and source for each cost. The source and derivation of costs is a very important step in the Budget Analysis. The documentation provides an audit trail and explanation of each

cost. The cost documentation should include the following three elements:

- 1) *Description of Cost.* A description of all components included in the cost estimate must be provided. The description should include exactly what has been included in the cost calculation.
 - 2) The analyst should include a step-by-step breakdown of the final cost by showing the mathematical calculation. Any inflation that was applied should also be shown in the equation.
 - 3) *Source.* How the cost was estimated is very important. By documenting the source in the analysis, the analyst adds credibility to the analysis.
- e. *Handling of Inflation.* Although a Budget Analysis is done in constant dollars (where inflation is not applied to costs), the analyst will sometimes come across inflated or deflated prices when gathering cost estimates. For example, the analyst might only be able to get a cost estimate in 1997 dollars when the start year of the analysis is 1998. Similarly, an analyst might only be provided with 1999 costs when the start year of the analysis is 1998. To address this problem, the analyst must either inflate or deflate the cost estimate(s) to the start year of the analysis.
- 1) *Inflate cost.* Suppose a cost estimate (\$100) is given using 1997 prices, but the start year of the analysis is 1999. Because costs in a Budget Analysis are estimated using start year prices, the analyst must inflate this cost from 1997 prices to 1999 prices. This is done simply by using the 1998 and 1999 inflation rates as shown in the example below. The inflation rates used here are for example purposes only, and the appropriate inflation rates can be found in Appendix D.

		1998		1999	
1997	Inflation			Inflation	
1999					
<u>Cost</u>	Rate (5%)			Rate (7%)	
<u>Cost</u>					
\$100	x	1.05	x	1.07	= 112.35

- 2) *Deflate Cost.* Similarly, suppose a cost estimate (\$100) is given in 1999 prices, but the start year of the analysis is 1997. Because costs in a Budget Analysis are estimated using start year prices, the analyst must deflate this cost from 1999 prices to 1997 prices. This is done simply by using the 1998 and 1997 inflation rates as shown in the example below. The inflation rates used here are for example purposes only, and the appropriate inflation rates can be found in Appendix D.

		1998		1999	
1997	Inflation			Inflation	
1999					
<u>Cost</u>	Rate (7%)			Rate (5%)	
<u>Cost</u>					
\$100	x	1.07	x	1.05	= 89.01

5. **Report Results and Recommendations.** The final step in the Budget Analysis is reporting the results and recommendations. The results and recommendations must be clear, concise, and easy to understand. Include a discussion of why the selected alternative was chosen and any important information about the life-cycle costs of the alternatives. It is important to discuss all factors because a decision can be based on qualitative as well as quantitative considerations.

Budget Analysis Report

1. **Report Format.** After the Budget Analysis is completed, the results must be communicated in an easily understood format. A complete Budget Analysis report will contain all of the following:

- a. *Executive Summary.* The first section of the report should be an executive summary. This section contains the following:

BUDGET ANALYSIS COST DISPLAY					
Year	COST ELEMENTS (actual \$s)				Total Annual Outlays
	Hardware	Installation	Maintenance	Supplies	
1999	68,385	3,600			71,985
2000			30,000	23,040	53,040
2001			30,000	23,040	53,040
2002			30,000	23,040	53,040
2003			30,000	23,040	53,040
2004			30,000	23,040	53,040
Total Outlays For Alternative =					337,185

- € the project title,
- € project objective,
- € assumptions,
- € alternatives considered (feasible and infeasible),
- € the selected alternative,
- € results and recommendation.

b. *Life-Cycle Cost Report.* This section contains tables of all of the program costs for the selected alternative. The tables display the occurrences and patterns of costs over the period of analysis. An example cost report is shown on the next page.

c. *Source and Derivation of Costs.* This section documents the sources and derivations for all costs associated with the selected alternative, including all breakdowns and mathematical equations. The following example provides a properly documented cost derivation.

2. **Report Review Guidelines.** The following is a guide for reviewing the Budget Analysis. It can be used as a guideline for both preparers and reviewers of Budget Analyses.

a. *Objective, Assumptions, and Alternatives.*

- 1) Is the actual problem addressed and stated?
- 2) Is the objective stated in unbiased terms?
- 3) Is any assumption too restrictive, broad, or vague?

4) Are uncertainties treated as facts?

5) Are any reasonable alternatives omitted from discussion?

6) Are all alternatives well defined and thoroughly discussed?

```

COST ELEMENT:  Maintenance
1 year contract (includes all
parts and labor;
on call 5 days/week) @
2,500/printer/year
x 4 printers           = $10,000
Maintenance Total     = $10,000/yr

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Source:  Average of 5 current
vendor maintenance contracts for
laser printers
(ProPrint, Hardware Plus,
CompCity, GraphicsCo, and
Johnny's Laserprinters).

```

b. Cost Estimates.

- 1) Are all cost-estimating methods used explained and/or appropriate?
- 2) Are all relevant costs for the selected alternative included?
- 3) Are sunk costs properly excluded?
- 4) Are the sources and calculations of the cost data documented? Are they accurate and applicable?
- 5) Are all cost estimates in constant dollars? Has inflation been properly excluded?

c. Parameters.

- 1) Is there any lead time between the investment and the start of the selected alternative's economic life?
- 2) Is the economic life of the selected alternative reasonable and its source given?
- 3) Is the period of analysis appropriate?

d. Results and Recommendations.

- 1) Is there adequate justification for the selected alternative?
- 2) Does the selection make sense intuitively?

3. **Example.** The following is an example of a proper Budget Analysis report. It is important to note that this example is intended only as a guideline for the analyst to follow, for each analysis will be different.

PROJECT EXECUTIVE SUMMARY**Project Title:** LASERBOARD INSTALLATION**Period of Analysis:** 6 Years**Start Year:** 1999

Project Objective: To provide laser printing capabilities to 72 employees. Capabilities should provide a wait time of no more than three minutes and allow users to continue working while waiting for documents to print.

Assumptions:

1. The start year is 1999.
2. Lead time (period extending from the expenditure of funds to the completion of installation) is one year.
3. The economic life of the selected alternative is five years.
4. Printer use is expected to remain constant over the period of analysis.
5. Personnel and workload are expected to remain constant over the period of analysis.
6. All costs were estimated using 1999 prices.
7. No training is required for this alternative.

Alternatives Considered:

1. *STATUS QUO*: Currently, 3 PCs are connected to laser printers. All employees must place their files on a diskette. When an employee wants to print a file they must go to a PC with a laser printer connected and print from there. This causes employees to wait in line to print their documents as others are printing. Since this alternative does not satisfy all of the criteria, it is not feasible.
2. *3270 TERMINAL EMULATION*: Provides 3270 terminal emulation for personal computers (PCs). Users would then dial up the organization's mainframe to submit jobs, directing the output to the centrally located laser printer. This alternative was not selected because the mainframe printer is located on the first floor and would cause employees to travel back and forth between the first and sixth floor several times daily to receive their print jobs.
3. *ONE-FOR-ONE CONNECTION*: Provides for a laser printer to be directly attached to every personal computer. This option is not feasible due to lack of space at individual work stations.
4. *LAN CONNECTION*: This alternative provides laser printer services to all of the employees' personal computers by sharing resources over a LAN. This solution allows the employees to continue working while waiting for documents to print. On average, wait time is approximately 2.5 minutes. Printers would be a shared resource, servicing the individual offices and user clusters of up to eight people. One PC in each cluster

would act as the printer server. This alternative, however, was not selected due to the high costs of implementation and maintenance. Both of these costs reflect the LAN's many capabilities, all of which are, except for printing capability, unnecessary for the project objective. Therefore, this alternative was not selected.

5. **LASERBOARD INSTALLATION** (selected alternative): This solution provides efficient and dependable laser printer capability to all employees via their personal computers. A laserboard, connecting up to six employees to a single printer, would be installed in the existing printers and in nine additional printers that will be purchased. Every personal computer will be connected to a printer with modular cables. The laserboard virtually eliminates printer wait time with its oversized buffer, and every employee will be free to do other tasks on their personal computers while waiting for their print jobs.

Results and Recommendations: The selected alternative is Laserboard Installation. The total life cycle cost of the Laserboard Installation is \$337,185 and the program cost falls within the Class VI(C) range of \$50K - \$250K (note: remember that program costs are costs incurred from project initiation through full deployment). This alternative satisfies all criteria of the project objective in an inexpensive manner, is less costly than a LAN, and does not present the logistical problems associated with the terminal emulation alternative.

LIFE CYCLE COST REPORT

LIFE CYCLE COSTS: LASERBOARD INSTALLATION					
Year	COST ELEMENTS (actual \$)				Total Annual Outlays
	Hardware	Installation	Main-tenance	Supplies	
1999	68,385	3,600			71,985
2000			30,000	23,040	53,040
2001			30,000	23,040	53,040
2002			30,000	23,040	53,040
2003			30,000	23,040	53,040
2004			30,000	23,040	53,040
Total Outlays For Alternative =					337,185

Source and Derivation of Costs

1. Hardware.

A.	9 laser printers (17 ppm, 600 dpi, dual bins, transparency capability, envelope, label, and front/back printing) @ \$6,500 per printer =	\$58,500
B.	12 Laserboards (6 serial, 1 parallel input) @ \$700 per Laserboard =	\$8,400
C.	72 modular adapters (1 per each work station) @ \$10.20 per adapter =	\$735
D.	3,000 feet of modular cabling @ \$.25/ft =	<u>\$750</u>
Hardware Total =		\$68,385

Source: Black Box Catalog, February 1998.

2. Installation.

240 hours of labor @ 15.00/hour (Washington D.C. area estimate) =	<u>\$ 3,600</u>
Installation Total =	\$ 3,600

Source: Survey of 5 D.C. area hardware installation firms (Hardware Servicers, CompService, ProInstall, TechMasters, and Rp.U.Off and Sons).

3. Maintenance.

1 year contract (includes all parts and labor; on call 5 days/week) @ 2,500/printer/year x 12 printers =	<u>\$30,000</u>
Maintenance Total =	\$30,000/yr

Source: Average of 5 current vendor maintenance contracts for CompCity, GasplanisCo, (Rt. Printy Hardware Plus).

4. Supplies.

A.	2 cases of paper (10 reams per case) per month per printer x 12 printers x 12 months @ \$30/case =	\$8,640
B.	1 toner cartridge per printer per month x 12 printers x 12 months @ 100/cartridge =	<u>\$14,400</u>
Supplies Total =		\$23,040/yr

Source: Prices derived from the previous 12 supply orders for the office.